MCV4U Name:_____

Unit 1 Test – The Limit!
PRACTICE VERSION

Expectation	Level Achieved
A1 - demonstrate an understanding of rate of change by making connections between average rate of change over an interval and instantaneous rate of change at a point, using the slopes of secants and tangents and the **concept of the limit**;	

Thinking More About Communication:

	Incomplete I	**Unacceptable R**	**Poor 1**	**Acceptable 2**	**Good 3**	**Outstanding 4**
TECHNICAL CORRECTNESS OF SOLUTIONS	All or most solutions are blank	No solutions are correct or many left blank	Few solutions are technically correct	Some solutions are technically correct	Most solutions are technically correct	All or almost all solutions are technically correct
PRESENTATION OF SOLUTIONS	All or most solutions are blank	No evidence of presentation or many solutions left blank	Solutions to few problems stand alone	Solutions to some problems can stand alone	Solutions to most problems can stand alone	Solutions to all or almost all problems can stand alone

1. Find the equation of the tangent using first principles, given $f(x)=\dfrac{3x}{x-9}$ at x = 8.

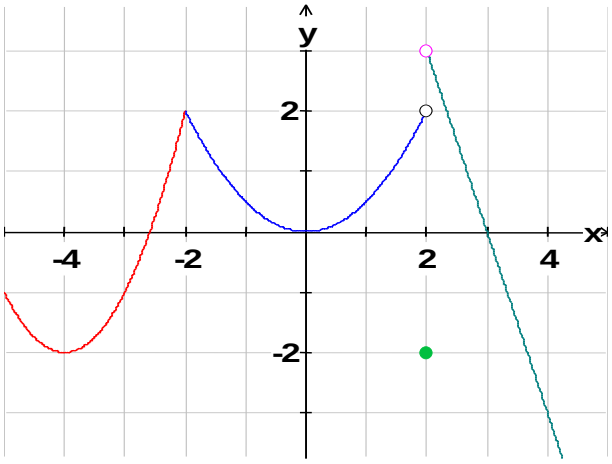
2. From the graph of $y = f(x)$ evaluate

$\lim\limits_{x\to 2^-} f(x)$

$\lim\limits_{x\to 2^+} f(x)$

$\lim\limits_{x\to 2} f(x)$

$\lim\limits_{x\to 4} f(x)$



3. Evaluate the following limits, if they exist. If a limit doesn't exist, explain why.

a) $\lim\limits_{x\to 6}(4x^2-3x)$

b) $\lim\limits_{x\to 1}\dfrac{x^2-6x+5}{x^2-3x+2}$

c) $\lim\limits_{x\to 0}\dfrac{\sqrt{4-x}-2x}{x}$

d) $\lim\limits_{x\to 4}\dfrac{3}{x^2-16}$

e) $\lim\limits_{x\to 7}\dfrac{\frac{1}{3}-\frac{1}{x}}{x-7}$

f) $\lim\limits_{x\to 8}\dfrac{2-\sqrt[3]{x}}{8-x}$

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4. The position function of an object is given by the equation $h(t) = -9.8t^2 + 6t + 30$, where h is the height in meters above the ground and t is the time in seconds. At **what time** and **with what velocity** will the object hit the ground?

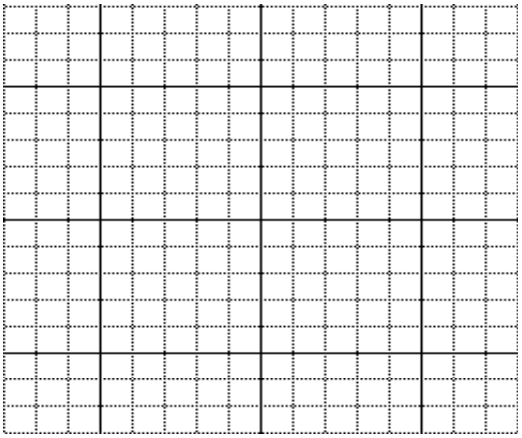
5. Using first principles (limits), find the equation of the tangent line to the curve $y = x^2 + x - 5$ at x = -3.

6. Draw any function that meets the following criteria:

$f(-3) = 2$ $\lim_{x \to 1} f(x) = DNE$

$\lim_{x \to -1^-} f(x) = -4$ $\lim_{x \to -1^+} f(x) = 2$

$f(x)$ is not continuous at x = -5



7. If $\lim_{x \to 0} f(x) = 1$ and $\lim_{x \to 0} g(x) = 2$, evaluate.

a) $\lim_{x \to 0}[f(x) - 6g(x)]$ b) $\lim_{x \to 0} \frac{5f(x)}{2g(x)}$ c) $\lim_{x \to 0} -3f(x)$

8. Find the points on the graph of $y = x^3 - 3x$ where the slope of the tangent line is horizontal.

9. Determine the quadratic function $f(x) = ax^2 + bx + c, a \neq 0$, that satisfy the conditions f(0) = 1 , $\lim_{x \to 1} f(x) = -7$, and $\lim_{x \to -2} f(x) = 3$.

10. Find the equation of the line that passes through $(2,4)$ and is perpendicular to the line tangent to the curve $y = x^2 + x - 5$ at x = -3.